

## Library Book Collection Information System (Case Study: Labuhanbatu University)

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### Abstract

*The Labuhanbatu University Library has the goal of supporting information needs, increasing the number of visitors, interest in reading and the number of books borrowed. Every year this library procures a new collection of books, so it is important to know the types of books that are a priority for increasing the number. But currently the library is facing problems in the process of grouping book collections which are still done manually. This process takes a long time and requires high accuracy to avoid errors in grouping books. Therefore, an appropriate solution is needed by utilizing technology to assist librarians in grouping book data quickly and easily. The results of this study succeeded in designing a Book Collection Grouping Information System at the Labuhanbatu University Library. Based on the results of the Blackbox test, it shows that the system created is in accordance with user needs and has successfully passed all the tests carried out, thus indicating that the system can be used by the Labuhanbatu University Library.*

### Keywords

*Library, Information System, Book Collection, Blackbox Testing.*



## I. Introduction

The library is an institution that collects, stores, and takes good care of printed works as a source of learning and information for those in need (Jamali, 2023).

The Labuhan Batu University Library has a strong commitment to meeting the information needs of its users, increasing the number of visitors, and encouraging interest in reading and borrowing books. To ensure that the book collection remains up-to-date, the library regularly manages new books. In order to determine the types of books that should be given priority to be reproduced, it is necessary to analyze data on book lending transactions. By processing this data, libraries can identify the genres or subjects that users are most interested in, thereby enabling decision- title " Library Book Collection Information System (Case Study: Labuhanbatu University)" It is hoped that this will be able to help readers find books without having to look for books one by one. in the library and can make it easier for readers to find books making based on accurate information in developing a collection of books.

However, currently there are problems faced by the Labuhan Batu University Library, namely the process of grouping book collections that still require recording books one by one or manually. This causes the book grouping process to take longer and requires a high level of accuracy to avoid errors that can cause inconsistencies in grouping books. So from this, Labuhan Batu University needs an appropriate solution by utilizing

technology to be able to help the university, especially librarians, in grouping book data quickly and easily.

So, based on the problems experienced by Labuhan Batu University, the author raised the theme for writing this thesis proposal with the vary, including processing business transactions, making decisions, archiving data, and monitoring organizational performance(Mawarti et al., n.d.)

## **II. Review of Literature**

There are several theoretical foundations for the research conducted, namely as follows:

### **2.1 System**

The system is a collection of components that are interconnected, collaborate, interact and work together to carry out specific tasks and achieve certain goals(Ulfah & Irtwaty, 2022). Then another understanding that the system is an entity that includes several components that are related to a particular goal. The system consists of several components that are related and work together to achieve goals, and have boundaries or environments that limit the system from the outside environment(Nirmala et al., 2020).

### **2.2 Information**

Information refers to raw data that is processed into a form that is more useful for the recipient to make decisions now or in the future(Ulfah & Irtwaty, 2022)Then Information can be interpreted as the result of data processing, where data is converted into a form that has meaning and value for the recipient. Information can be in the form of facts, concepts, knowledge, or messages, which are conveyed through various media such as written text, images, audio, or video(Mawarti et al., n.d.)

### **2.3 Information System**

Information System is a series of organizational steps or procedures which, once executed, will produce useful information for a person and enable organizational control(Ulfah & Irtwaty, 2022). Then the Information System consists of software, hardware, and procedures that are built to collect, process, store, secure, and distribute useful information for organizations or business entities. The objectives of information systems can vary, including processing business transactions, making decisions, archiving data, and monitoring organizational performance (Mawarti et al., n.d.).

### **2.4 Library**

Libraries are institutions or locations that store collections of library materials such as books, magazines, newspapers, documents, and audio or visual materials, which are available for borrowing or use by people for educational, research, or entertainment purposes.(Suri & Arifin, 2020)

### **2.5 Website**

*Website* is a site or a set of pages that can be viewed via the internet and created using a particular programming language. Websites are generally used to display various kinds of content, such as information, images, audio, video, and other content that can be accessed by internet users(Tewuh Clivan et al., 2019)

## 2.6 Book Grouping

Book grouping is the process of categorizing books based on various relevant criteria. The purpose of this grouping is to provide an organized framework and make it easier for users or readers to find books that match certain interests, needs or topics.

## 2.7 HTML

The HTML (Hypertext Markup Language) programming language is used to create web pages by creating the structure, appearance, and basic content of the web. HTML is considered the foundation of the web and is the foundation for building web pages (Kusumaningrum et al., 2022). Each HTML tag has a specific function and meaning, and is used to control the appearance and behavior of elements on a web page. With HTML, users can create web pages with the look and function they want (Rivanthio, 2020).

## 2.8 PHP

PHP or Hypertext Preprocessor is a server-side programming language that functions to build web applications. PHP can be used in conjunction with other programming languages such as HTML, CSS, and others to produce more complex and interactive web applications. (Supriatiningsih, 2020)

## 2.9 MySQL

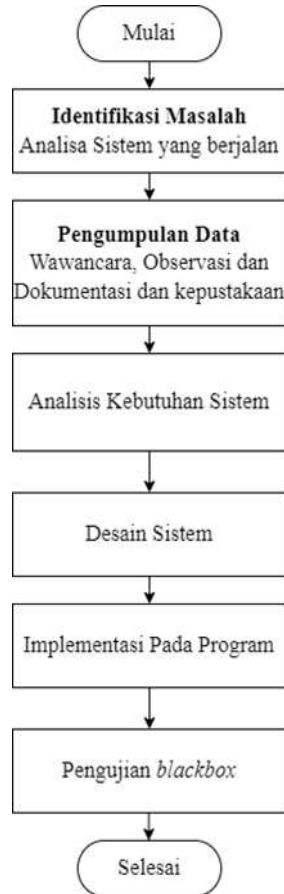
MySQL is a very well-known and widely used relational database management system (RDBMS). MySQL is software with an open source license which means it can be used free of charge and modified by users according to their needs (Pangastuti et al., 2021).

## 2.10 Blackbox Testing

*Blackbox Testing*.e. a type of software test performed without knowing or paying attention to the internal details of the program code. In black box testing, the primary focus is on the input and output of the software being tested, and is not concerned with how the program is implemented or works behind the layers. (Prawira & Wulandari, 2022). The purpose of black box testing is to see that the software can function according to the specifications and user needs. The techniques used in blackbox testing include functional testing, non-functional testing, and integration testing (Uminingsih et al., 2022).

### III. Research Methods

The stages of this research are shown in Figure 1 which describes the sequence of research steps to be carried out, namely:



*Figure 1. Research Stages*

The further explanation regarding the stages in this study are:

#### 3.1 Identification of problems

In this stage the researcher identified the problems in the Labuhanbatu University library. As for this stage, the researcher conducted an analysis of the system that is currently running at the Labuhanbatu University library to find out the problems that occur.

#### 3.2 Data collection

Collecting research data using interviews with the library to gain an understanding of the system that is running. In addition, direct observation of the process of grouping book collections was also carried out. Data is also collected through documents related to the ongoing system and through library research to study theory and research related to the grouping of book collections in the library. All this data will be an important basis in the next stage.

#### 3.3 System Requirements Analysis

After the data was collected, the researchers conducted a needs analysis for a more effective and efficient book collection grouping information system. The purpose of this analysis is to identify the desired features and functionality in the new system. System

requirements analysis assists in formulating system requirements that must be met to solve existing problems and increase the operational efficiency of the library.

### **3.4 System Design**

At this stage the researcher designed an information system for grouping book collections that meet the identified needs using UML diagrams such as use cases, activity diagrams, sequence diagrams and class diagrams. In addition, researchers also determine the appropriate database structure to store book collection data efficiently.

### **3.5 Program Implementation**

After the system design is made, the researcher implements the design in the form of a program using the programming language PHP, HTML and MySQL database. This implementation phase involves coding and developing the system according to the design that has been made.

### **3.6 Black box testing**

The final stage is to carry out the Blackbox testing phase to ensure that the book collection grouping system functions properly and meets user needs. During testing the researcher tests the functionality of the system and verifies whether all the features are working properly.

## **IV. Results and Discussion**

### **4.1 Identification of problems**

In the analysis stage of the running system, several problems were found in the process of grouping book collections at the Labuhanbatu University library. One of the main problems identified is the process of grouping books which is done manually by recording books one by one. This method is time consuming and prone to human error in grouping books. To improve efficiency and accuracy in grouping books, it is necessary to implement a website-based system that can automate the process of grouping books. This new system is expected to overcome existing problems and provide better benefits for the Labuhanbatu University library.

This process is where students come directly to the library to return books, then the library staff opens the website to see the date of borrowing and returning the book, if it is past the return date then a fine will be imposed.

### **4.2 Data collection**

Data collection methods in this study include observation, interviews, documentation, and literature study. Observations were made directly at the Labuhan Batu University Library to observe and record data managed by librarians. Interviews were conducted with the Head of Libraries and librarians to obtain information about the running system. Documentation is done by studying documents such as pictures and book data recaps in softcopy form provided by librarians. Meanwhile, literature study was conducted to study sources such as books, journals, and research related to grouping books. By using these methods researchers can collect accurate data for analysis of information system needs for grouping book collections in libraries.

The following is a needs analysis in this study, namely:

#### **a. Input Analysis (Input Analysis)**

Input analysis is all input data in the form of documents that can be processed so that it can produce an output. The input documents that will be used to produce an output are as follows:

1. Member Data

2. Book Data
3. Book Loan Data
4. Book return

## **b. Proses Analysis**

### 1. Process Member Data

This process is a data collection process for new members at the Labuhan Batu University library to be inputted by the librarian by their names into the system. This process is also to record library books.

### 2. Book Data Process

This process is where when a book is entered, the officer will record all the book data in the ledger before placing it on the library bookshelf. Book Borrowing Data Process

### 3. Book Return Data Process

This process is where students come directly to the library to borrow books, then hand over the books to be borrowed to the library staff to scan the barcodes.

### 4. Book Return Data Process

This process is where students come directly to the library to return books, then the library staff opens the website to see the date of borrowing and returning the book, if it is past the return date then a fine will be imposed.

## **c. Output Analysis**

Output analysis or output is all output data that is processed in the process so that it can produce information in the form of a report. The output document results from the input data are as follows:

1. Member Data Report
2. Book Data Report
3. Book Loan Report
4. Book Return Report

## **d. Information Needs**

Information needs in this research are:

1. Book Data
2. Library Member Data
3. Grouping Result Book Data

## **e. Hardware Requirements**

The hardware requirements in this study are as follows:

1. brand : HP 240 G3 Notebook PC
2. type : X64 Based PC
3. Processor : Intel Core i5-5200U
4. Memory : 4GB
5. Hard drive : 143GB

## **f. Software Requirements**

To build and create this decision support system using the following software requirements:

1. Windows 10 Operating System

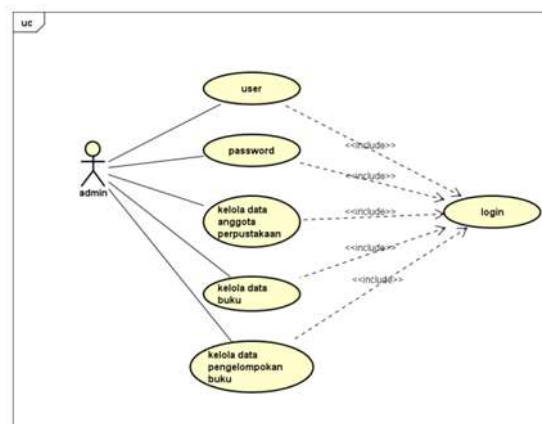
2. PHP Programming Language
3. MySQL databases
4. Text Editor Sublime Text

### 4.3 System Design

At this stage the researcher designed an information system using UML diagrams such as use cases, activity diagrams, sequence diagrams and class diagrams. The following are the results of the design in this study:

#### a. UsecaseDiagram

A use case diagram is an image representation of the relationship between actors and the system itself to achieve certain goals or desired results. The following is the use case diagram of this research, namely:

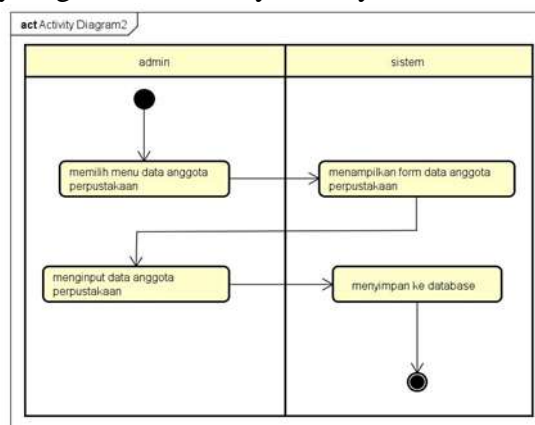


*Figure 2. Usecase Diagrams*

Figure 2 shows the admin can log in, manage book data, manage library member data, and manage book groupings.

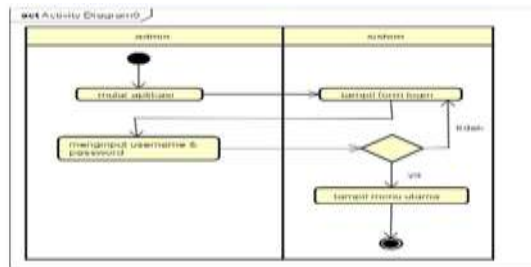
#### b. Activity diagram

This activity activity diagram in this study, namely:



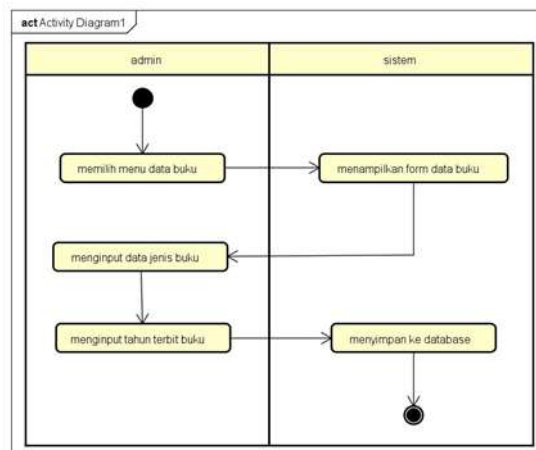
*Figure 3. Library Member Data Add Activity Diagram*

Figure 3 shows an activity diagram for managing library member data. This activity begins by selecting the Library Member Data menu, the system will display the library member data form and then the admin can input library member data which will then be saved to the database.



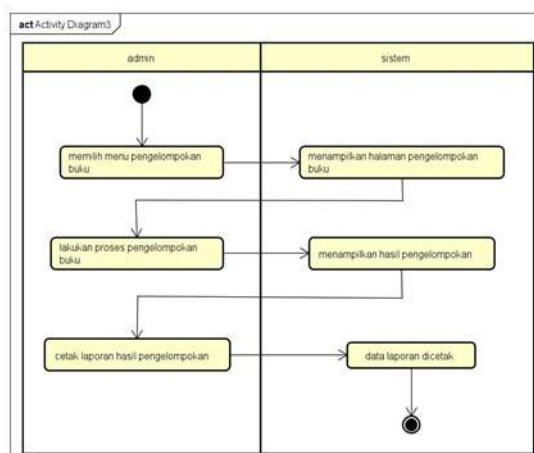
**Figure 4.** Login Activity Diagrams

Figure 4 shows a diagram of admin login activity on the system. The system will display a login page to the user and the user must fill out the form provided. If the username and password are valid then the admin will enter into the system.



**Figure 5.** Add Book Activity Diagram

Figure 5 an activity for managing book data. In this diagram, the activities that admin can do are aimed at adding book data.



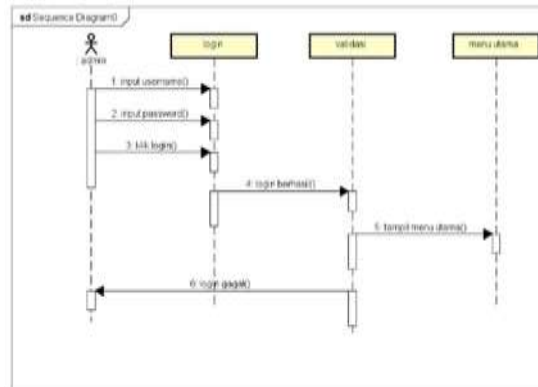
**Figure 6.** Book grouping activity diagram



Figure 6 shows the activity for managing book grouping data, this activity begins by selecting the Grouping menu, the system will display the grouping page, so the admin can carry out the grouping process so that the grouping results can be displayed by the system, then the admin can print the grouping results report.

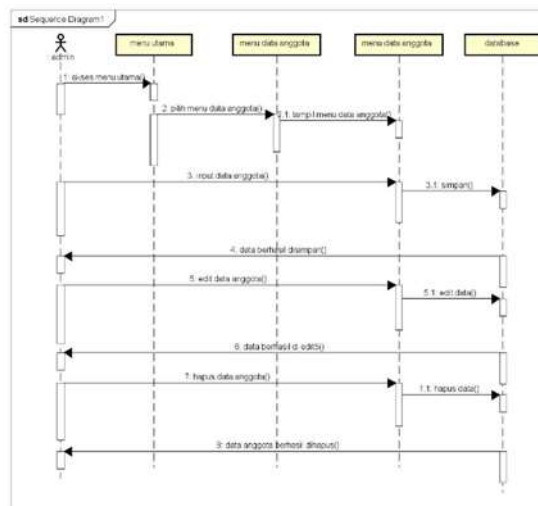
### c. Sequence Diagrams

Sequence Diagrams is a diagram used to model the relationship between objects in a system or application. This diagram shows the sequence and flow of messages or activities that occur between objects in the system or application. The following is the Sequence Diagram in this study:



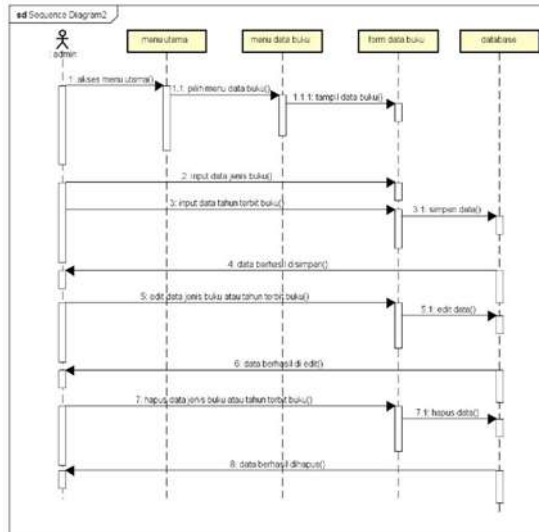
**Figure 7. Login Sequences**

Figure 7 shows the login sequence diagram. This page appears when the admin accesses the website. Then the admin enters the login form data and clicks the login button. After that the system will validate. If it is correct then the main menu will appear. If it is wrong, the admin must re-login



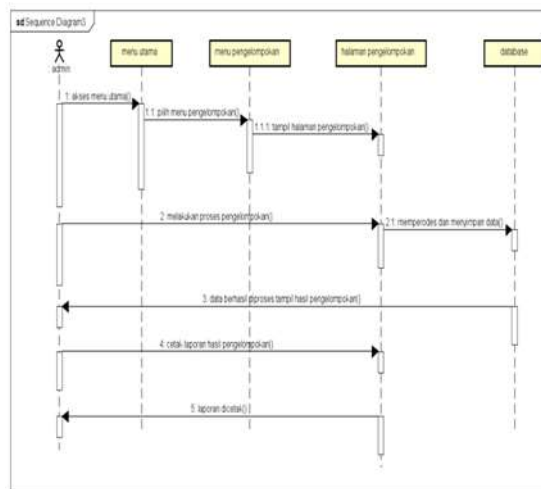
**Figure 8. Library Member Data Sequence Diagram**

Figure 8 shows the Sequence Diagram where the admin accesses the main menu and selects the Library Member Data menu. Then the system will display a library member data form so that the admin can input library member data which will then be saved to the database. Admins can also manage member data by editing and deleting registered library member data.



**Figure 9. Book Data Sequence Diagrams**

Figure 9 shows the Sequence Diagram where the Admin accesses the main menu, and selects the Book Data menu. Then the system will show a book data form, so the admin can input data on the type of book and the year the book was published which will then be saved to the database. Admins can also manage book data by editing and deleting stored book data.



**Figure 10. Book Grouping Sequence Diagram**

Figure 9 shows the Sequence Diagram where the Admin accesses the main menu, and selects the Book Grouping menu. Then the system will show the book grouping page. Admins can also print reports on the results of grouping books.

**d. Class Diagrams**

Class diagrams is a structure that represents and defines the classes designed to make up the system. The following is the design class diagram of this research:

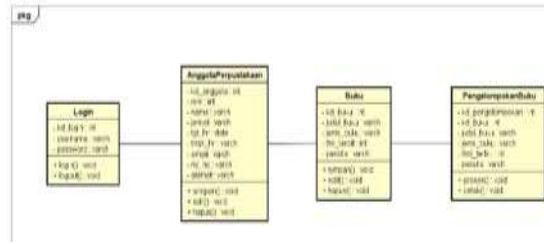


Figure 11. Class diagrams

#### 4.4 Program Implementation

After the system design is made, the researcher implements the design in the form of a program using the programming language PHP, HTML and MySql database. This implementation phase involves coding and developing the system according to the design that has been made. The following are the results of the implementation of the design in the program, namely as follows:



Figure 12. Home view

Figure 12 displays the display of the Home page of the Book Collection Grouping Information System at the Labuhanbatu University Library. This page appears when the user accesses the information system website.



Figure 13. Main page

Figure 13 displays the main page view of the Book Collection Grouping Information System at the Library. This page appears after the user has successfully logged into the system.

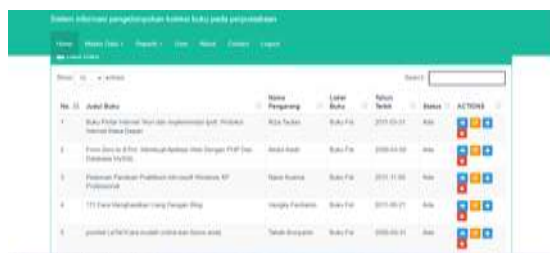
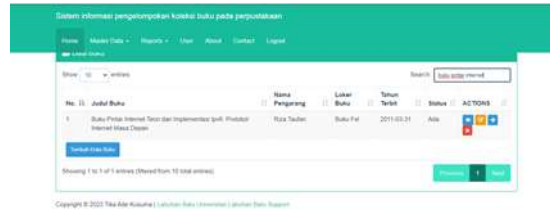


Figure 14. Book List Page

Figure 14 displays the book list page in the Book Collection Classification Information System at the Labuhanbatu University Library. After clicking on "Master Data" then the user can choose between "List of Books" and "Loans". The book list page displays a collection of books with detailed information and there are search and filter features to make it easier for users to find the book they are looking for.



**Figure 15. Book Search Results**

Figure 15 shows the results of a book search in the Book Collection Classification Information System at the Labuhanbatu University Library. Users can enter keywords in the search field and the system will display search results for the appropriate book.



**Figure 16. Add Loan Data**

Figure 16 shows the "Add Loan Data" page in the Book Collection Classification Information System at the Labuhanbatu University Library. Users can click the blue arrow to borrow books. Then the system will display a form containing columns for the name, date and description of the borrower and after that the user clicks "Save Loans" to save the data. The result of adding borrowing data is shown in Figure 16.



**Figure 17. Results of Added Loans**

No. Urut	Judul Buku	Pengarang	Penerbit	Tahun Terbit	Latar Buku	Wajar Buku	Penerbit Buku
1	Buku Pengantar Internet Teori dan Implementasinya pada Perangkat Lunak Internet Mampu Diakses	Risa Tachin	Elisa Simba Kumpang	2019.05.31	Buku Pdf	4 - 379 - 317	Akses Pustaka S.P
2	Peraturan Pemerintah Republik Indonesia tentang Perubahan Atas Peraturan Menteri Pendidikan dan Kebudayaan Nomor 103 Tahun 2016 tentang Standar Nasional Pendidikan	Nana Syaodih	Nana Syaodih	2016.11.09	Buku Pdf	6 - 379 - 219	Akses Pustaka S.P
3	111 Cara Mengembangkan Kemampuan Berpikir Kritis dan Kreatif Matematis	Hengky Hendarto	ANCA	2019.08.27	Buku Pdf	7 - 379 - 0	Akses Pustaka S.P

**Figure 18. Book Report**

Figure 18 shows the Book Report on the Book Collection Grouping Information System at the Labuhanbatu University Library. This report helps users to group books by year. On this page the user can print book report data based on the choice to print all books, print monthly or print annually.

**Figure 19. Print Page**

#### 4.5 Black box testing

The final stage is to carry out the Blackbox testing phase to ensure that the book collection grouping system functions properly and suits the user.

During testing the researcher tests the functionality of the system and verifies whether all the features are working properly. The following are the results of Blackbox testing in this study, namely:

**Table 1. Black box testing**

Activity	Test Scenario	Expected results	Results
Admin logs in	Enter username and password	If the username and password match the database then the admin enters the main page	Succeed
		A notification or warning appears if the password or username is incorrect and returns to the Login page	Succeed
Admin manages book data	Add book data	Data added successfully	Succeed
	Deleting book data	Data deleted successfully	Succeed
	Change book data	Data successfully changed	Succeed
	View book data	Data successfully displayed	
Admin manages Member Data	Add Member Data	Data added successfully	Succeed
	Delete Member Data	Data deleted successfully	Succeed
	Changing Member Data	Data successfully changed	Succeed

	View Member Data	Display data	Succeed
Admin manages Book Grouping Data	View the book's Data Report	Display data	Succeed
	Prints all book data	Print data of all book data in PDF format	Succeed
	Print monthly book data	Print monthly book data in PDF format	Succeed
	Print book data per year	Print yearly book data in PDF format	Succeed
Search for book data using keywords	Enter keywords in the search field	Displays the searched book data	Succeed

Based on the results of the Blackbox test, it can be seen that the system that has been developed is in accordance with user requirements and has successfully passed all the tests carried out. Thus this shows that the system can be used by the Labuhanbatu University Library

## V. Conclusions

Based on the results of the research and discussion that has been carried out regarding the design of a Book Collection Classification Information System at the Labuhanbatu University Library, it can be concluded that this research succeeded in designing a Book Collection Grouping Information System at the Labuhanbatu University Library which can assist universities in grouping book collections in libraries, managing book data, borrowing and searching books quickly. The results of the Blackbox test show that the designed system is in accordance with user needs and has successfully passed all the tests carried out so that it shows that the system can be used by the Labuhanbatu University Library.

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